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(54) Title: METHOD AND DEVICE FOR CORRECTING THE DRIFT OFFSET OF A PRESSURE SENSOR OF A FLOWMETER

(57) Abstract

A portable, battery powered, hand-held system for releasing a controlled dose of aerosol medication for inhalation by a patient including a durable body and a medication cassette inserted in the durable body. The cassette includes a housing for containing a canister of medication, bears an identification code, and permits the canister to be manually depressed to release a dose, e.g., a metered dose, when out of the durable body. The durable body includes an actuator mechanism for engaging an inserted cassette and its canister, and an actuator release mechanism for controlling the actuator mechanism to depress the canister for a selected period of time to release the desired dose of medication and then to release the canister. The actuator mechanism, includes a compression spring for depressing the canister and a torsion spring for reloading the compression spring. The torsion spring is reloaded by rotating the cassette from an open position for delivering aerosol to a closed position. The actuator release mechanism includes a motor and trigger pin assembly that controls the release of the compression spring and the torsion spring, and, hence, the time that the canister is depressed. The motor operates in response to sensed flow satisfying a selected delivery threshold. The durable body includes a flow sensor having an asymmetrical orifice that is calibrated, independent of the cassette, to convert the sensed pressure due to flow into a flow rate. The orifice is separately calibrated for an inhalation flow rate range and an exhalation flow rate range over a selected number of known flow rates. The sensed pressure value is corrected for transducer offset drift and converted to a flow rate using the calibration data and piecewise linear interpolation.

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INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 94/01082

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G01F1/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 754 651 (E.R. SHORTRIDGE) 5 July 1988 see column 16, line 1 - column 18, line 54; figure 6	1-15
A	EP,A,0 154 531 (SOUTHERN GAS ASSOCIATION) 11 September 1985 see page 5, last paragraph - page 10, paragraph 1; figure 1	1
A	EP,A,0 461 057 (COMAP) 11 December 1991 see claim 1	1
A	EP,A,0 057 938 (LINDE) 18 August 1982 see page 7, line 11 - page 12, line 2; figure 1	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 May 1994	25. 08. 94

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	HEINSIUS, R

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

:rnational application No.
PCT/US94/01082

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-15 Method and device for correcting the drift offset of a pressure sensor of a flowmeter.
2. Claims 16-33 Method for releasing a controlled amount of aerosol medication from a valved canister.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-15

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 94/01082

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4754651	05-07-88	US-A-	4911021	27-03-90
EP-A-0154531	11-09-85	US-A-	4654813	31-03-87
		DE-A-	3566039	08-12-88
EP-A-0461057	11-12-91	FR-A-	2663118	13-12-91
EP-A-0057938	18-08-82	DE-A-	3104833	19-08-82
		AT-T-	8535	15-08-84